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ABSTRACT

The relationship between self-concept and level of cognitive development were examined. It was hypothesized that level of cognitive development would predict self-concept response style, and that less cognitively mature young adolescents would have higher self-concept scores. The original subjects were 91 seventh graders who responded to two objective self-concept scales, to Piaget's pendulum and balance beam problems, and to a permutation problem. The data, analyzed by a multiple regression technique, indicated that cognitive level was a significant predictor of self-concept response style. Multivariate ANOVA's provided support for the remaining hypotheses. The less cognitively mature seventh-grade children scored higher on self-concept. A follow-up investigation of participants classified as both concrete thinkers and as extreme responders was conducted six months later and provided additional support for the hypotheses. These results were discussed in terms of changes in self-perceptions with increasing cognitive ability, the use of self-report scales with young adolescents, and the possibility of developing a theory of self-concept which includes Piagetian notions about the development of knowledge. (Author)

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A Longitudinal Investigation of Self-Concept and Cognitive Performance Changes in Young Adolescents

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ABSTRACT

This study examined the relationship between self-concept and level of cognitive development. It was hypothesized that level of cognitive development would predict self-concept response style, and that less cognitively mature young adolescents would have higher self-concept scores. The original subjects were 91 seventh graders who responded to two objective self-concept scales and to Piaget's pendulum and balance beam problems and to a permutation problem. The data, analyzed by a multiple regression technique, indicated that cognitive level was a significant predictor of self-concept response style. Multivariate ANOVA's provided support for the remaining hypotheses. The less cognitively mature seventh-grade children scored higher on self-concept. A follow-up investigation of participants classified as both concrete thinkers and as extreme responders was conducted six months later and provided additional support for the hypotheses. These results were discussed in terms of changes in self-perceptions with increasing cognitive ability, the use of self-report scales with young adolescents, and the possibility of developing a theory of self-concept which includes Piagetian notions about the development of knowledge.

Garwood (1976), in a study examining the relationship between first-name desirability and self-concept and achievement in a group of lower socioeconomic level black and white sixth-grade males, found that self-concept and standardized achievement scores were positively related to name desirability ratings only when self-concept was assessed subjectively. When self-concept was measured with an objective five-point rating scale measure, neither the predicted relationship between name desirability and the dependent measures nor the traditional positive relationship between self-concept and achievement scores held. Taken by themselves, the objective self-concept data are no less surprising than a number of other recent self-concept studies indicating that disadvantaged sixth-graders have higher self-concepts than more advantaged sixth-graders. (e.g., Busk, Ford, and Schulman, 1973; Zirkel and Moses, 1971). Had the Garwood study not included a subjective self-concept measure and a homogeneous population these data probably would have gone unchallenged. However, since the two self-concept measures presented conflicting outcomes, the data were inspected more closely.

The final sample included 47 children. These children represented those whose names had occurred with a frequency of three or more, selected from an initial random sample of 174 sixth-graders drawn from eight public middle schools in a large urban area. There were no significant race or SES effects on any of the dependent measures, and only children whose names were consistently rated as desirable or undesirable by black and white elementary teachers were used. Thus, it did not seem likely that the unexpected objective and subjective self-concept discrepancy was an artifact of the research design. Likewise, both self-concept instruments used report satisfactory reliability and validity. Instead, upon inspecting the data, the only between-group differences that seemed meaningful centered around the manner used by the children in describing themselves on the objective self-concept measure. The children with significantly

higher achievement and subjective self-concept scores also significantly more often chose to describe themselves on the objective self-concept measure by selecting intermediate scale values (2s and 5s). The children with lower achievement and subjective self-concept scores, however, significantly more often chose rating scale extremes (1s and 5s) to describe themselves on the objective self-concept measure.

In an effort to find an answer to this puzzle, other self-concept studies using similar populations and instruments were reviewed. Given the social concerns of the late sixties and the seventies, most of these have been concerned with analyzing ethnic differences in self-concept. Some, which looked at self-reported self-concept in children in grades other than sixth, found no meaningful differences. For example, Carpenter and Busse (1969), using a five-point scale, found no race differences for lower-class fifth-grade children. Likewise, Coleman et al. (1966) found no racial differences in self-concept among ninth and twelfth graders who completed a five-point scale. On the other hand, Soares and Soares (1969; 1971) and Shaw (1974) did find racial differences among sixth-graders who responded to a self-report likert scale. However, other studies which have used only an "agree/disagree" format to assess self-concept, have not reported self-concept differences among black and white sixth-graders (Busk, Ford, and Schulman, 1973; Getsinger, Kunce, Miller, and Weinberg, 1972; Trowbridge, Trowbridge, and Trowbridge, 1972; and Zirkel and Moses, 1971).

Thus it appears that self-concept results are affected not only by how self-concept is measured, but also by when it is measured. Subjective and "agree/disagree" formats appear to show little meaningful race or SES differences at any age, but likert-type rating scales do appear to result in differential outcomes, especially at the beginning of adolescence. Such differential outcomes have been interpreted as indicating that disadvantaged blacks have higher self-concepts

because they are not expected to achieve as much as more advantaged and white children are and therefore their self-concepts do not suffer. This argument is used by those who find that disadvantaged blacks have higher self-concepts than advantaged whites, i.e., Soares and Soares. The other interpretation is that school integration affects self-concept. This argument is used by those researchers who find lower self-concepts for blacks than for whites. Either argument is weak and fails to take into account another and perhaps more meaningful factor: cognitive ability.

Self-concept research has been conducted largely using psychometric approaches, similar to achievement. That is, self-concept is assumed to increase in a linear fashion until some ceiling established by a particular scale is reached. Unfortunately such an approach denies the view that self-concept may have a qualitative as well as a quantitative nature. Instead, since the stress is on measurement only, a "good" self-concept is reflected in a higher score. This is analogous to achievement measures, and self-concept and achievement are usually positively correlated. This relationship is then taken as evidence that improvement in one leads to improvement in the other. Thus, when attempts to improve school learning among the culturally disadvantaged directly did not show much success, enhancement of self-concept was seen as a possible route to enhancement of learning. This view led to the research studies examining self-concept and race or cultural disadvantagement cited above.

As Wylie (1974) points out, self-concept research lacks cohesiveness. There are too many unreplicated studies and too many self-concept instruments and too little theory. Because of this self-concept appears to have become reified as an entity unto itself. What then is self-concept? McDavid and Garwood (1978) define it as a cognitive belief system, one which involves a particular set of attitudes, all integrated into organized and consistent

behavior within the individual. Its development is based on language, social feedback, and personal success and failure experiences. The self-concept reflects what the individual thinks about himself as an object. This view is derived from Mead's (1934) position that the self is primarily cognitive, and evolves through thinking about one's self as an object in relation to the Generalized Other, a set of attitudes and corresponding responses which reflect the individual's selection of information from others toward him. This latter ability requires role-taking skills which are cognitively based and developmental in nature, and which tie self-concept development to cognitive development.

This point of view finds support in the person-perception or social cognition literature. There is evidence which indicates that before the age of 11 or so children are incapable of processing discrepant information about another person (Livesly & Bromley, 1973; Watts, 1944); their concepts of others tend to be univariate. For example, a person can be viewed as either good or bad but not sometimes good and sometimes bad. But about 11 years of age, children begin to recognize that other people may possess both desirable and undesirable traits and they begin to be able to process such discrepant information in forming unified impressions of others. Such a process is consistent with Werner's (1961) view that with increasing age children's views of others become more ordered, hierarchialized, and differentiated, and concrete thought structures give way to abstract thought structures composed of diverse lower-order structures. Piaget has proposed a similar process for our developing understanding of environmental events, and has described some of the changes that distinguish formal from concrete thought process. These changes, as summarized by Cowan (1976), include: (1) discovering the world of the hypothetical; (2) creating experiments to examine relationships between hypotheses and data; (3) developing more sophisticated patterns of deductive

thought; and (4) relying on more formal schemes such as proportion, probability, equilibrated systems, etc. All of these changes enable the adolescent to develop a four dimensional outlook on the world, whereas the concrete operational adolescent is still using only a three dimensional outlook.

It is possible that these changes occurring in person-perception at the beginning of adolescence may be related to the changes occurring in the young adolescent's thought processes, especially since the changes in person-perception parallel the shift from reliance on concrete thought structures to increasing reliance on more formal thought structures. Thus, if perception of others has a cognitive-developmental component, then perception of self also may be based on similar developmental processes. Perceptions of self would become more differentiated with the onset of formal thought processes, and young adolescents would begin to incorporate discrepant information into concepts used to describe themselves.

Operationally this would mean that young adolescents who are less cognitively mature would tend to describe themselves more in terms of absolutes. That is, when responding on a likert-type scale to such statements as "I never tell a lie" of "I am happy with my body," these individuals, because of this inability to process discrete information, would tend to more often select extreme scale descriptors like "always true" or "very false." The more cognitively mature adolescents, because of their more differentiated self-image and their increased ability to process discrepant self-information, would tend to describe themselves by selecting less-extreme descriptors, like "mostly true" or "partly false," indicating greater flexibility in self-description. When translated into self-concept scores, however, it is possible that the less cognitively mature individuals would receive higher self-concept scores than would the more cognitively mature individuals, due to this tendency to select

extreme responses on objective self-concept scales. Thus, the individual's level of cognitive ability may be a more important factor in predicting self-concept than race, SES or other variables like attending an integrated school. This seems especially likely as the adolescent moves into reliance on more abstract thought processes for understanding himself.

The primary purpose of this study then was to determine if a relationship did exist between level of cognitive development and self-concept response style in a sample of black and white young adolescents. We assumed that, if such a relationship could be shown, level of cognitive development, and not race, would be a meaningful predictor of self-concept response style. We also hypothesized that less cognitively mature adolescents would score higher on self-reported self-concept measures than would their more cognitively mature counterparts.

INVESTIGATION 1

Method

Subjects

The initial participants were 125 seventh-graders attending a magnet public middle school in New Orleans, Louisiana. These students, from various parts of the city, had chosen to attend this school, which has regular, accelerated, and alternative educational programs. It is considered one of the city's best public schools, and is located near two universities and in a middle-class neighborhood. The socioeconomic backgrounds of these students are diverse, with fathers' occupations ranging from porter or day-laborer to college professor, architect, or physician. From this original group, 91 were selected to participate. Their average age was 12.5 years. Table 1 contains sex and ethnic data for these children.

Instruments and Apparatus

Demographic Information. All participants completed a questionnaire which asked for data on sex, age, race, father's presence and occupation, total number of siblings, kindergarten and day care attendance, liking for school and liking for their name. Father's occupation was coded as follows: one, blue collar/ clerical job; two, managerial or technical job; and three, professional position. Both "Liking for School" and "Liking for Name" were answered by marking a scale which ranged from one (A lot) to four (Not at All). Father presence was coded one (1) if yes or zero (0) if no.

Piagetian Tasks. Three Piagetian tasks were used to determine level of cognitive development, as recommended by Neimark (1975). These were the pendulum problem, which assesses separation of variables; the balance problem, which assesses proportionality; and a permutations problem, which assesses the scheme of combinations. The pendulum and balance problems were selected from Inhelder and Piaget (1958), and the apparatus and procedures followed are described therein. The permutations problem required the particpants to create as many combinations of a four digit number as they could (Busse, Mansfield, and Messinger, 1974).

This Piagetian approach was selected because it would enable us to classify our participants according to their use of more or less formal operational strategies in solving the problems presented to them. An IQ measure of cognitive level would not have allowed us to do this. We did, however, collect IQ estimates on all particpants so that we could look at the relationship between IQ and these three Piagetian tasks.

Procedures for scoring these tasks are based on performance levels identified by Inhelder and Piaget (1958; and follow the general criteria listed below. The number for each criterion is also the score value assigned for achieving that criterion.

1. Early Concrete, characterized by no or random attempts at varying task dimensions.
2. Late Concrete, characterized by recognition of the varying dimensions but the inability to systematically test out the effects of the variables and inability to coordinate the interaction of two or more variables.
3. Early Formal, characterized by systematically testing out the task dimensions which vary.
4. Late Formal, characterized by the behaviors described in 3 above plus the ability to generalize from the test situation to other similar situations.

In order to be classified at the level of formal thought a participant had to show evidence of Early Formal (3) or Late Formal (4) thinking on two of the three tasks used (See Table 1).

Reliability of scoring was determined by having a second person independently score 25 randomly selected protocols. The two raters were in initial agreement 87 percent of the time. Disagreements were mutually resolved.

Insert Table 1 About Here

The Tennessee Self Concept Scale (TSCS). This is a 100 item self-report scale which requires the examinee to respond to questions like "I am an attractive person" or "I do not always tell the truth" by selecting a scale value ranging from "Completely False" (one point) to "Completely True" (five points). The TSCS provides a number of self-concept scores, all described by Fitts (1965). For this study we used the Total Self-Concept score, which reflects the individual's overall level of self-concept. High scores are interpreted as indicating that

the person likes herself, feels she is of value and worth, and is confident and acts accordingly. We also used the Personality Integration score which provides a measure of the individual's level of personal adjustment. Higher scores imply more personality integration or adjustment. Evidence of satisfactory reliability and validity is reported by Fitts (1965). This scale was also used by Garwood (1976).

Katz-Zigler Scale. This is also an objective self-concept scale consisting of 20 statements, half of which are positive ("I am popular with the other kids") and half are negative ("I often wish I were someone else"). There are six alternative responses to each statement, ranging from "Very True" to "Very Untrue." The examinee responds to each item by checking one of the six responses, and these marks are later converted to numerical values (1-6). This provides a measure of real self-concept (how the person sees himself or herself now). The same 20 statements are also used to measure ideal self-concept by rewording the sentences ("I would like to be popular with the other kids"). The most positive responses are scored with one point and the most negative receive six points so lower scores reflect better self-concepts. The resulting range for both real and ideal self-concept measures is from 20 (most positive) to 120 (most negative). The difference between real and ideal self-concept scores provides a measure of self-image discrepancy. Information regarding the scales' reliability and validity is contained in Katz and Zigler (1967) and Zigler, Ballas, and Watson (1972).

IQ. An IQ estimate was obtained by individually testing each child with the Wechsler Intelligence Scale for Children (WISC) vocabulary subtest. This scale is considered the best predictor of full-scale IQ (Wechsler, 1949), and was given prior to the Piagetian tasks.

Standardized Achievement. During the data collection phase and as part of

the school's testing program, all students took the Iowa Test of Basic Skills (Lindquist & Hieronymus, 1956), a standardized achievement battery used to measure school progress. Reliability and content validity are reported in the test manual. These data were obtained so that we could examine the relationship between self-concept and achievement.

Procedure

Self-concept response style was determined by each participant's performance on the two objective self-concept scales. Both tests were given in school and were administered by two white males. In order to be selected for the study a child had to use a consistent response pattern on both tests. An extreme response style was defined as the selection of more self-concept scale end-point values than intermediate scale values. A non-extreme response style was characterized by the choice of more intermediate scale values than extreme scale values. For example, a child who answered 50 TSCS items using 5s and 1s and 30 items using 4s and 2s was classified as an extreme responder on the TSCS. If he also answered, for example, 13 Katz-Zigler items using 6s and 1s and 5 items using 5s and 2s, he was classified as an extreme responder on this scale also, and was eligible to participate in the study. Table 1 contains the final breakdown of children by response styles. Of the initial 125, 34 were dropped for the following reasons: (a) mixed response style, 25; (b) equally divided response style, 5; (c) unscorable, 2; (d) nonEnglish speaking, 1; and (e) moved away, 1. In category a, the 25 mixed response protocols were broken down as follows:

black males (6) - four were extreme responders on the TSCS (67%);

white males (6) - four were extreme responders on the TSCS (67%);

black females (9) - six were extreme responders on the TSCS (67%);

white females (4) - three were extreme responders on the TSCS (67%).

As these data indicate, more participants selected extreme responses on the

Tennessee Self Concept Scale than the Katz-Zigler Scale, probably because on the TSCS they respond by selecting a number but on the Katz-Zigler they simply check an item and this is later converted to a number. Also the TSCS is five times longer so they have more opportunity to select extremes.

After the determination of self-concept response style, an estimate of each child's intelligence was collected (WISC vocabulary scores) and subsequently each child was individually tested on the three Piagetian tasks: the pendulum, the balance, and the permutation problem. Testing was conducted by a white male and a black female and both were unaware of the research hypotheses or the classifications of students as extreme and non-extreme responders. The order of task presentation was counterbalanced to control for any order effects. All children were tested in a quiet and private corner of the school library, and data collection ranged over two and one-half months, in the spring of 1977.

RESULTS

The self-concept and cognitive performance results were initially subjected to a Race x Sex multivariate ANOVA. No significant sex differences were found so these data were collapsed across sex. Race was a significant main effect, $F(7, 81) = 4.59$, $p = .0002$, and this variable was retained in all further analyses.

The means for the concrete and formal participants' performance on the three Piagetian tasks are contained in Table 9. The order of difficulty of these tasks, from easiest to most difficult is permutations, pendulum, and balance, and these findings are consistent with other studies (Marotorano, 1977). Forty percent of the participants passed the permutations problem at the formal level, 32 percent passed the pendulum problem at the formal level, but only 16 percent passed the balance problem at this level.

The seventh graders were initially classified as either extreme or non-extreme responders; this variable is referred to as Response Style. Subsequent

to their performance on the Piagetian tasks and based on this performance, the participants were dichotomized into concrete and formal thinkers. This variable is termed Cognitive Level. The first hypothesis was that Cognitive Level would be a significant predictor of Response Style. To determine if the predicted relationship existed, Cognitive Level and 16 other predictor variables (See Table 2) were analyzed by Stepwise Regression (Dixon, 1970), which tests the contribution of each variable already in the equation as if it were to enter last. This is done at each step and allows for the removal of variables which no longer are significant contributors to prediction. The F-level for inclusion of a variable was set at .01; and for exclusion, .005.

In this analysis, four of the 17 predictor variables accounted for 42 percent of the total variance in Response Style. The final multiple R for the complete equation was .50, and the best predictor of Response Style was the variable, Cognitive Level ($F = 26.52$, $p < .01$). In addition, Katz-Zigler Real Self scores ($F = 13.10$, $p < .01$), Father Presence ($F = 5.99$, $p < .05$), and Liking for School ($F = 6.85$, p .05) were also significant predictors of the variable, Response Style. IQ was not a meaningful predictor of Response Style though it did correlate significantly with other cognitive measures (.59 with verbal achievement scores and .58 with math achievement scores). Table 2 lists the variables which entered the prediction equation, variance accounted for, and their F values.

Since there were significant race differences in the initial Race x Sex MANOVA, the first hypothesis was retested using the same procedures but separately by ethnic groups. For whites, Cognitive Level was again the best predictor, $F(1,38) = 13.82$, $p < .01$), accounting for 29 percent of the total variance. All 16 variables entered the equation and accounted for 70 percent of the variance in Response Style (See Table 3). For blacks, TSCS Total Self-Concept was the best predictor of Response Style, $F(1,49) = 8.68$, $p < .01$,

but Cognitive Level was also a significant predictor, F (1, 49) = 4.51, $p < .05$. Together these two accounted for 22 percent of the variance in Response Style (See Table 4).

Overall these data support our first hypothesis, especially for white participants. While Cognitive Level was not the best predictor for black participants, it was the second and only other significant predictor of Response Style for them. Thus, how these young adolescents described themselves on two objective self-concept scales, that is, their response style, appears to be cognitively based. As a further check on this interpretation, the self-concept, cognitive performance, standardized achievement, IQ, and demographic data were subjected to a Principal Components factor analysis using the varimax criterion. Four factors were rotated, and are illustrated in Table 5 Self-Concept Response Style loaded only on Factor 3, which contains the cognitive performance measures, adding additional support to our first hypothesis.

Insert Tables 2-4 About Here

Insert Table 5 About Here

Our second hypothesis was that young adolescents who were less cognitively mature would have higher self-concept scores. To test this hypothesis the data were analyzed using a multivariate ANOVA, with Race and Cognitive Level the independent variables. The multiple dependent measures were the four self-concept scores (Real Self, Ideal Self, TSCS Total Self Concept, and Personality Integration). Rao's approximate F-ratios (4, 84 df) were computed for testing each Wilks Lambda. For Race the F-ratio was 6.10, $p = .0002$. Katz-Zigler Real

Self, TSCS Total Self-Concept, and Personality Integration were all significantly different. Blacks had higher Katz-Zigler Real Self scores. The means were 48.33 and 46.22 for black concrete and formal participants respectively and 52.75 and 58.19 for white concrete and formal participants.* Blacks also had higher TSCS Total Self-Concept scores. Again the means were 353.95 and 335.44 for black concrete and formal participants versus 328.50 and 321.25 for white concrete and formal participants. However, whites had higher Personality Integration scores: the means were 6.83 and 9.06 for the concrete and formal white participants and 4.76 and 7.22 for the black participants.

Cognitive Level was also a significant main effect, with Rao's approximate F-ratio equalling 4.90, $p = .002$. On both the Katz-Zigler and the TSCS, those participants who were classified at the concrete level of thought scored higher (Real Self, 49.94*; TSCS, 344.70), than did those participants classified at the formal thought level (Real Self, 53.88*; TSCS, 326.36). There were no interactions.

Our hypothesis that less cognitively mature adolescents would have higher self-concepts was supported by these findings. This result also held within the two ethnic groups. As the means indicate, concrete subjects, regardless of ethnic membership, had higher self-concept scores than did the formal participants. That this relationship did not hold on the Personality Integration scores across ethnic groups (but did within ethnic groups) probably reflects differences in cultural values regarding what is a well-integrated personality and not true differences between the two ethnic groups.

As a further check on this relationship, correlations between participants' achievement scores and their self-concept scores were calculated. Traditionally

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*On this scale a lower score is considered to reflect more positive self-concept.

the literature has shown a positive relationship between self-concept and achievement (See Purkey, 1970). If our prediction was correct, however, the reverse should be true for these young adolescents. This was in fact the case for all participants: verbal achievement scores correlated -.12 with TSCS scores and .11 with Katz-Zigler Real Self scores (See Table 6). For blacks and whites separately the correlations between TSCS scores and verbal achievement are zero-order (See Table 7). On the Katz-Zigler, the correlation for whites was .13, indicating that self-concept and achievement were inversely related. But for black adolescents this correlation was -.13, indicating a positive relationship between self-concept and achievement. This differential outcome is probably due to more blacks being at the concrete level of cognitive development when the traditional self-concept and achievement relationship would be expected to hold.

Table 7 includes a number of other significant and interesting correlational patterns. For white adolescents, day care attendance was associated with Response Style (-.38), Cognitive Level (.38), liking for one's first-name (-.34), and verbal achievement scores. All these relationships were strengthened by increased day care attendance, but kindergarten attendance was not related to any of the variables. This cluster provides additional support for our argument that Response Style is a cognitive measure, thus indirectly supporting the view that self-concept is a cognitive construct. Liking your name was positively related to TSCS scores (.34) and to Katz-Zigler Real Self scores (-.34); this can be interpreted as a self-concept variable and so its place in the above cluster seems logical. Verbal achievement scores were associated with Cognitive Level (.62), father presence (.35), day care (.33), math achievement (.75) and IQ (.43); but math achievement was only related to Cognitive Level (.57) and to IQ (.43). IQ was associated with father's occupation (.38) and with both achievement measures. Both TSCS Total Self-Concept and Katz-Zigler Real Self correlated highly (.91), and, finally, the more siblings around the lower was the adolescent's self-

concept (TSCS, -.34; Real Self, .29 (n.s.). However, without data on birth order, it is difficult to know how to interpret this relationship.

Fewer meaningful relationships emerged among the black participants. Day care was only related to the total number of siblings (-.37). Apparently the more siblings available to care for black children the less likely they are to attend a day care facility. Indirectly this implies that many black parents may be viewing day care more as a baby sitting facility than as an educational facility. However, this picture is not necessarily a negative one. IQ was positively related to the total number of siblings, so perhaps even if black children in large families are less likely to attend day care, apparently they do learn from their siblings. Blacks' verbal achievement scores are related to Cognitive Level (.33), father's occupation (.41), Math Achievement (.45) and IQ (.47), and Math Achievement is also related to Cognitive Level (.30), IQ (.52), Katz-Zigler Real Self (-.31) and Katz-Zigler Ideal Self (-.39). Finally both self-concept measures are highly correlated (-.63).

In this experiment we attempted to show that for young adolescents, performance of self-reported self-concept measures was related to level of cognitive development and that a higher self-concept score did not necessarily reflect a "better" self-concept at this age. While the results of this experiment do support this argument, they are confounded by the unequal distribution of black and white subjects (especially black females) into concrete and formal categories. This was unavoidable but it does limit the interpretations that could be made from these data. To overcome this confounding effect we felt that an examination of changes over time, in both self-concept and cognitive performances, might be helpful in supporting our original hypotheses. Specifically we felt that our original hypothesis would receive additional support if we could show that, with cognitive growth among these participants originally

classified as both extreme responders and concrete thinkers (n=32), there would be a decrease both in the use of an extreme response style and a decrease in self-concept paralleling the increases in cognitive growth. Therefore, we waited six months and collected the self-concept and Piagetian task performance data again. This second investigation is described below.

INVESTIGATION 2

Method

Subjects

Thirty-two subjects were available from the original group of participants, and all were now eighth-grade students. Nineteen were black females, five were white females, four were black males, and four were white males. Once again, black females represented the largest number of participants, which was now desirable since we hoped to show that changes in self-concept were more a function of changes in cognitive ability and not due to just ethnic status. These 32 participants (60 percent) were all that were available from the original group of 53 subjects who were classified as both concrete thinkers and as extreme responders. Seventeen (32 percent) have not returned to this school and four (eight percent) were chronic absentees.

Procedure

These young adolescents were tested by two Tulane University students, one of whom was responsible for data collection in Investigation 1. The procedures for collecting and scoring these data are the same as those described in the first investigation. Reliability of scoring was determined by the same procedures as those described earlier, using 16 complete protocols, and percentage of agreement was .89; disagreements were mutually resolved. These data were gathered six months after the original data collection, during the late fall of 1977.

Instruments and Apparatus

Investigation 2 used the same two self-concept measures as described in Investigation 1 as well as the same three Piagetian tasks.

RESULTS

In this follow-up investigation we were concerned with overcoming some of the interpretive difficulties caused by the confounding effects of race and cognitive level in the first study. Essentially we hoped that after six-months time, these 35 black and white particpants from study 1 would show changes in cognitive ability associated with changes in their self-concept scores and response style. To test our hypotheses, these pre and post data were analyzed using the t-test for self-paired samples (Nie, Hull, Jenkins, Steinbrenner, and Brent, 1975).

As indicated by the means in Table 9, cognitive growth did occur over the six month interval, particularly on the permutation problem. On this task participants significantly increased their ability to reach a solution (t (31) = 3.79, p = .01). There was no change in ability to permutate four digits for five participants and two participants regressed, but the remaining young adolescents showed increased ability to systematically group four digit numbers into appropriate clusters. Most used incomplete groups of two and three four-digit clusters in the initial study. By the follow-up investigation, many of these had begun to group their four-digit combinations into the four possible clusters but these clusters still did not contain all possible combinations (See Table 8).

In the initial data collection period we did not indicate to the participants that their solution was correct or incorrect. None asked for this information, and thus none were shown the correct solution. The significant increases that did occur, then, are not likely due to any prior

information about the correct solution. Nor is it likely that these gains are due to any statistical regression phenomena since the remaining two Piagetian problems show no parallel increases. On these two tasks the increases in performance, while not significant, were in the right direction. There is some comfort in these results, for had there been significant increases in all three,one could argue that the effects were due more to test-retest or regression effects or to unreliability than to any changes in cognitive ability.

Originally these participants were all classified as extreme responders on the two self-concept measures. This was no longer the case. Four had become non-extreme responders on both instruments and another five had become non-extreme responders on the Katz-Zigler Scale. This pattern of change on the two instruments is consistent with the data reported in Investigation 1 for the 25 participants who were dropped for mixed protocols.

Our first prediction was again supported: participants showed a decrease in their reliance on an extreme response style and an increase in their selection of intermediate scale values to describe themselves on both self-concept scales. Specifically that was a significant increase in the use of fives and twos for self description on the Katz-Zigler Scale, $t\ (31) = -2.98, p=.0006$, and a significant decrease in the use of sixes and ones for self-description on this scale, $t\ (31) = 2.01$, $p = .05$. And there were parallel changes on the Tennessee Self-Concept scale but they were not significant. For the Tennessee scale there was a 53 percent decrease in the use of fives and ones, a 56 percent increase in the use of fours and twos, and a 63 percent decrease in the use of threes for self-description. On the Katz-Zigler Scale there was a 53 percent decrease in the use of sixes and ones, a 59 percent increase in the use of fives and twos, and a 50 percent decrease in the use of threes and fours for self-description. The significant findings on the Katz-Zigler scale and not the TSCS are probably associated with the tendency for particpants to shif from an extreme to an

intermediate response style on the Katz-Zigler Scale before doing so on the TSCS. As mentioned earlier, this may be due to the presence of the digits on the TSCS and not on the Katz-Zigler Scale or to differences in length of the two scores, or to both factors.

The prediction that self-concept scores would decrease received support from the nonsignificant decrease in Katz-Zigler Real Self scores and the significant increase in TSCS Personality Integration scores, $t(31) = 2.40$ $p = .02$. Thus, as these participants' Katz-Zigler Real Self-Concept showed a decrease, their adjustment level showed an increase. These findings were not replicated with the TSCS score. In fact, these self-concept scores showed a nonsignificant increase. We can speculate that this increase is somehow related to the cognitive changes that are occurring in these young adolescents, but the nature of this association is not clear enough to posit possible causes.

In summary we interpret these findings as supportive of our belief that the outcomes of the first investigation are due more to cognitive changes occurring in the young adolescent than they are to the effects of ethnic membership. It is obvious that there are race effects in these data, but, more than likely, they represent an indirect manifestation of experience or cultural deficits rather than cognitive differences.

DISCUSSION

The results of these two investigations indicate that, for young adolescents, level of cognitive development appears to act as a mediating variable, affecting their ability to respond to multiple-interval self-concept scales. These data also imply that changes in self-perception occur concomitantly with, or soon after, the emergence of early formal cognitive abilities. Therefore, discussions of self-concept differences in young adolescents are incomplete unless they also include information about cognitive ability. This finding is important for several reasons. One, it provides support for Mead's (1934) argument that self-concept is a cognitive variable: It does not emerge out of emotional factors, as argued by Cooley (1902) and James (1910), but precedes and governs the affective aspects of the self. Such a position implies that ideas about one's self are cognitive-developmental in nature and therefore should show recognizable trends or characteristics associated with developing cognitive skills. We have evidence that knowledge about the physical world and about other people follows recognizable developmental patterns associated with cognitive growth. It should come as no surprise that knowledge about one's self may develop in similar fashion.

Another reason these data are important is that they indicate that young adolescents who are classified at the concrete level of cognitive development tend to hold univariate impressions of themselves. Young adolescents who are classified as formal thinkers, however, tend to have more multivariate impressions of themselves: they are more likely to see themselves as being represented by a continuum of variability reflecting multiple instead of dichotomous choices. This change in self-perception or self-descriptive ability may be related to other notions of adolescent behavior, among them Sturm und Drang, introspection, and identity formation.

Sturm und Drang denotes the high degree of variability in young adolescents'

behavior. It describes the extreme and quick shifts occurring in moods as well as in behaviors, from happy to sad, active to quiet,etc. This type of behavioral activity reflects a type of extreme response style which may be related to the young adolescent's lack of formal operational abilities. With the emergence of such abilities, however, the young adolescent may be better able to place him- or herself within a framework of dimensional variability, which would then allow for more gradual shifts of mood or behavior. Thus, the young adolescent's behavior would gradually become more stable and predictable.

Another characteristic of early adolescence is introspection or self-searching behavior. This ability to critically examine ones self, including one's thoughts as well as one's behaviors, depends in part on the emerging ability to coordinate four dimensions. Thus introspection is associated with the emergence of formal operational abilities. The data from these two investigations indicate that as young adolescents begin to rely more on formal operational schemes their self-descriptions tend to become more differentiated. Perhaps it is this ability to make finer and finer distinctions in one's self-view that results in the young adolescent's introspective behavior.

For many theorists, and especially Erikson (1968),identity formation is the major task of adolescence. Erikson views identity formation as involving the successful resolution of a number of different conflicts relating to career choices, sexuality, time, developing a fit for various individual roles, etc. Resolving these conflicts will enable the adolescent to successfully locate his or her self in relation to the past, present, and future. Thus, formal operational abilities are required, and are associated with the adolescent's developing ability to hold multivariate self-impressions. It is this latter ability which may be the one necessary for incorporating and forming a unified identity, derived from the resolution of the various identity crisis issues

described by Erikson. Some support for this view comes from Piaget's remarks to Erikson (Tanner and Inhelder, 1958) that formal operations may be necessary if identity formation issues are to be raised at all, for the adolescent needs to be able to consider his self in relation to the almost limitless number of possibilities associated with identity formation.

Significant effects were found for Race in these data. It is difficult, however, to make much of this in these data because race is confounded with social class and many of the differences that have been ascribed to ethnic membership may be due in reality to social class and associated experiential/ attitudinal differences. For both ethnic groups, Cognitive Level was a significant predictor of Response Style, but it was a better predictor for whites than for blacks. Again this difference could as likely be due to experience differences as to ethnic differences. What is clear from these data regarding ethnic differences is that conclusions regarding differences in self-concepts of advantaged and disadvantaged black and white adolescents can no longer be explained by reliance just on differences in expectations held by others regarding young adolescents' performance. Also differences in self-concepts that have, in the past, been related to school integration can no longer be explained by total reliance on environmental factors external to the individual. It is doubtful that the studies cited earlier would have found the differences they reported if they had controlled for the mediating influence of cognitive level.

Another problem in these data is associated with the design of the study. We did not anticipate the longitudinal investigation. It was decided upon after we realized that race and cognitive level were confounded in Investigation 1. Because we did not anticipate it, no initial control group was included to enable us to control for retest effects. However, a careful inspection of the data in

Investigation 2 reveals that the changes that did occur over the six-month interval are more likely due to cognitive growth than to just a regression or retest effect. We have already mentioned the differences in permutations, pendulum, and balance problem scores as supporting a growth effect and not a retest effect. In addition, an examination of Table 9 indicates changes in scores from Investigation 1 to Investigation 2 which are not likely due to just retest effects alone. These include the change in the use of TSCS 5s and 1s to 4s and 2s, and the less than one point difference in the change of Katz-Zigler Real Self scores but the nearly nine point difference in the change of TSCS Total Self scores. The magnitude of these changes is greater than one would expect from just retest effects. Despite this attempt at rationalization, the reader is cautioned to recall the design problems when interpreting these data.

The primary goal of this study was to investigate the relationships between an individual's level of cognitive development and his or her self-concept. We found that level of cognitive development, as determined by performance on three Piagetian tasks, was a significant predictor of an adolescent's self-concept response style. Young adolescents classified as formal thinkers chose to describe themselves on two self-concept measures by using intermediate scale values but young adolescents who were classified as concrete thinkers more often chose to describe themselves using extreme scale values. The formal group, however, had lower self-concept scores than did the concrete group.

A longitudinal follow-up investigation of only those participants who were still in the same school and who had originally been classified as both concrete thinkers and as extreme responders provided additional support for the findings from the first investigation. An examination of Table 9 indicates that the directional patterns of the means for both the original concrete and formal

participants as well as for the differences in the follow-up group are similar. Apparently, with increasing cognitive maturity, young adolescents begin to describe themselves more flexibly, indicating their ability and/or willingness to incorporate discrepant self-information into their self-concepts. Associated with these changes are decreases in measured self-concept. In the past, researchers have explained self-concept differences in groups of young adolescents by arguing that such differences were due to differences in the performance expectations of others or to success-failure experiences of the individual. No doubt these explanations are valid but they don't appear to go far enough. As these data indicate, discussions of self-concept differences in young adolescents should include information about the level of cognitive development of these young adolescents.

The results of this study are also consistent with the changes in person-perception described by Watts (1944) and by Livesly and Bromley (1973). Apparently at the beginning of adolescence children begin to be better able to form unified impressions out of conflicting data--about others and themselves. This change corresponds in time with the emergence of formal operations, and the developing ability to use more abstract thoguth processes seems related to this change in self-perception. If so, it may be fruitful to formulate a theory of self-concept which incorporates Piagetian notions about the development of children's understanding about objects and people. These data provide some support, and there is additional support for such a theory in the findings of Humphreys (1975). He studied self-concept real-ideal differences and ability to conserve and his findings suggest that self-concept development follows a pattern similar to conservation development. Thus prior to developing the ability to conserve the child is not self-evaluative.

Finally, these data suggest that self-report self-concept measures need to

be interpreted carefully by clinicians, school personnel, researchers, etc., particularly when used with children who are moving into adolescence.

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FOOTNOTES

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TABLE 1

Percentage of Seventh-Graders Classified by

Self-Concept Response Style and Level of Cognitive Development

Subjects N = 91	Response Style		Cognitive Level	
	Extreme	Non-Extreme	Concrete	Formal
White Male N = 17	47	53	47	53
White Female N = 23	39	61	43	57
Black Male N = 15	80	20	47	53
Black	97	03	78	22

TABLE 2

Stepwise Regression Summary Table for All Participants

Step Number	Variable	R^2	F Value
1	Cognitive Level	.23	26.52**
2	Katz-Zigler Real Self	.33	13.10**
3	Father Presence	.37	5.99*
4	Liking for School	.42	6.86*
5	Father's Occupation	.43	1.82
6	Katz-Zigler Discrepancy	.44	1.46
7	Liking for Name	.46	2.67
8	Math Achievement	.47	2.53
9	Kindergarten Attendance	.49	1.98
10	TSCS Total Self-Concept	.49	.64
11	Katz-Zigler Ideal Self	.50	.64
12	Verbal Achievement	.50	.36
13	IQ	.50	.47
14	Race	.50	.18
15	Day Care Attendance	.50	.07
16	Number of Years of Day Care	.50	.02

**p .01

*p .05

TABLE 3

Stepwise Regression Summary Table for

White Participants, N = 51

Step Number	Variable	R^2	F Value
1	Cognitive Level	.29	13.82*
2	Verbal Achievement	.33	2.03
3	Father Presence	.39	2.95
4	Day Care Attendance	.42	1.65
5	Liking for School	.44	1.27
6	Kindergarten Attendance	.47	1.89
7	Katz-Zigler Real Self	.49	1.12
8	TSCS Total Self-Concept	.55	3.35
9	Total Number of Siblings	.58	1.74
10	Katz-Zigler Discrepancy	.61	2.19
11	Katz-Zigler Ideal Self	.64	1.96
12	IQ	.67	1.97
13	Liking for Name	.69	1.18
14	Father's Occupation	.69	.49
15	Number of Years of Day Care	.70	.38
16	Math Achievement	.70	.03

*p .01

TABLE 4

Stepwise Regression Summary Table for

Black Participants, N = 40

Step Number	Variable	R^2	F Value
1	TSCS Total Self-Concept	.15	8.68**
2	Cognitive Level	.22	4.51*
3	Liking for School	.25	1.73
4	Number of Years of Day Care	.28	1.82
5	Katz-Zigler Real Self	.30	1.32
6	Liking for Name	.33	1.67
7	Katz-Zigler Discrepancy	.37	2.87
8	Father Presence	.39	1.45
9	Verbal Achievement	.40	.83
10	Katz-Zigler Ideal Self	.41	.76
11	Day Care Attendance	.42	.63
12	Father's Occupation	.43	.43
13	IQ	.43	.11
14	Total Number of Siblings	.43	.18

**p .01

*p .05

TABLE 5

Factors and Loadings Derived From Principal Components Analysis

Of Cognitive, Self-Concept, And Demographic Data

Factor 1: Achievement		Factor 2: Self-Concept		Factor 3: Cognitive Performance		Factor 4: Day Care	
Math Applications	.86	Katz-Zigler Discrepancy	.85	Response Style	-.72	Day Care Number of	.91
Math Concepts	.84	Katz-Zigler Real Self	.83	Balance Beam	.63	Years of Day Care	.88
Reading Comprehension	.74	TSCS Total Self	-.83	Permutations	.47		
Vocabulary	.71			Pendulum	.42		
Math Computation	.71			Personality Integration	.53		
IQ	.63						
Katz-Zigler Ideal Self	-.57						
Percentage Variance	52.1	Percentage Variance	21.5	Percentage Variance	15.6	Percentage Variance	10.7

NOTE: Only Loadings greater than .40 were included.

TABLE 6

Correlation Coefficients Derived From Multiple Regression Analysis Of Predictor And Criterion Variables For All Participants

N = 91	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Father Presence		.34	.15	.26	.14	.15	-04	-05	.29	.15	-29	.09	-12	.09	-12	.14	.26	.00
2. Father's Occupation			-16	.19	.11	.03	.18	.00	.48	.23	-38	.14	-09	.15	-39	.36	.42	-12
3. Total # of Siblings				-29	-25	.07	-20	-05	-07	-01	.07	-06	-16	.12	.14	.07	.06	.01
4. Attended Day Care					.83	.14	.12	-06	.23	.02	-18	.13	-01	.06	-15	.25	.15	-06
5. No. Yrs., Day Care						.15	.07	.02	.30	.15	-14	.06	-09	.05	-11	.25	.21	-04
6. Attended Kindergarten							.14	.13	.06	.00	-09	.09	.08	-03	-03	.23	.01	-06
7. Liking for School								.26	.23	.11	-35	.25	-03	.25	-33	.18	.09	-31
8. Liking for Name									.00	.03	-14	.16	-22	.38	-17	-09	.04	-29
9. Verbal Achievement										.63	-34	.11	-25	.26	-32	.49	.59	-12
10. Math Achievement											-30	.00	-34	.25	-23	.45	.58	-07
11. Response Style												-41	-06	-26	.35	-48	-33	.41
12. KZ Real Self													.37	.64	-24	.20	.11	-79
13. KZ Ideal Self														-39	.07	-14	-30	-19
14. KZ Discrepancy															-29	.26	.32	-62
15. Race																-37	-29	.23
16. Cognitive Level																	.37	-27
17. IQ																		-19
18. TSCS																		

TABLE 7

Correlation Matrix Separated by Race: Blacks (N = 51) Above the Diagonal and White (N = 40) Below the Diagonal

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Response Style		∓34	∓08	∓24	∓11	.12	.15	∓13	∓21	.-06	∓17	.-07	∓16	.39	∓33	∓18	∓12
2. Cognitive Level	∓54		∓04	.31	.18	.09	.11	.22	.01	∓15	.33	.30	.38	∓21	.01	∓22	.20
3. Father Presence	∓36	.33		.21	.31	.21	.06	.05	∓01	∓12	.13	∓04	.13	.02	.13	∓10	.15
4. Father's Occupation	∓16	.21	.40		∓10	.14	.01	∓10	.13	∓15	.40	∓01	.22	∓02	.07	.04	.01
5. Total # of Siblings	∓07	.07	.13	.08		∓37	∓29	.02	∓12	∓07	.02	.08	.28	.02	∓06	∓20	.19
6. Attended Day Care	∓38	.38	.32	.17	∓06		.80	.15	.13	.10	.10	∓13	.02	.04	.09	∓10	.07
7. No. Yrs., Day Care	∓25	.40	.16	.09	∓05	.87		.16	.08	∓27	.17	.07	.16	.09	∓08	∓24	.05
8. Attended Kindergarten	∓07	.28	.32	.21	.20	.05	.10		.09	.17	.06	.10	.06	∓07	∓07	∓07	∓07
9. Liking for School	∓20	.12	∓22	∓12	∓22	.01	∓05	.24		.14	.24	.22	∓00	∓14	.11	.10	.04
10. Liking for Name	.02	∓20	∓10	∓10	.18	∓34	∓39	.08	.23		∓10	.19	.12	∓09	∓15	∓23	.17
11. Verbal Achievement	∓17	.62	.35	.29	.12	.33	.40	.16	∓07	∓14		.45	.47	.04	∓13	∓19	.00
12. Math Achievement	∓20	.57	.21	.19	.16	.17	.23	∓04	∓23	∓32	.75		.52	.08	∓31	∓39	.08
13. IQ	∓12	.26	.26	.38	.09	.28	.27	∓06	∓16	∓28	.57	.43		∓12	∓06	∓35	.22
14. TSCS Total	.18	∓22	.16	.14	∓34	∓11	∓06	.06	∓27	∓35	.02	.13	.08		∓63	∓31	∓51
15. Real Self	∓26	.30	∓17	∓13	.29	.11	.13	.06	.21	.35	.13	.00	∓04	∓92		.60	.52
16. Ideal Self	∓10	.00	∓12	∓16	∓22	.10	.09	.15	∓04	∓20	∓28	∓23	∓19	∓19	.20		∓21
17. Discrepancy	∓07	.18	∓11	∓08	.40	.02	.03	∓08	.18	.45	.25	.11	.11	∓62	.69	∓54	

TABLE 8

Longitudinal Changes in Concrete Subjects Ability

To Permutate Four Digits

Number of Subjects	Digit Clustering Patterns	
	Pre	Post
5	Random behavior	No Change
4	Random behavior	Groups digits in clusters of two's, i.e. 4781, 4718, then 7481, 7814, etc.
8	Groups digits in clusters of two's and three's, i.e. 4781, 4718, and/or 7481, 7418, 7184	No Change
10	Groups digits in clusters of two's and three's, i.e. 4781, 4718, and/or 7481, 7418, 7184	Groups digits into four major but incomplete groups
2	Groups digits in clusters of two's and three's	Groups completely all four digit clusters
3	Clusters digits into four major but incomplete groups	No Change

1	Random Behavior	Groups digits into four major but incomplete clusters
1 (R)	Groups digits into four major but incomplete clusters	Groups digits in clusters of two's
1 (R)	Groups digits in clusters of three's	Groups digits in clusters of two's

NOTE: (R) indicates regression

TABLE 9

Piagetian Task Means and Dependent Measure Means for Concrete and Formal Participants (Study 1) and for Longitudinal Changes in Concrete Participants (Study 2)

Measures	Study 1		Study 2	
	Concrete	Formal	Concrete 1	Concrete 2
Katz-Zigler Real Self	49.94	53.88	47.16	48.12
Katz-Zigler Ideal Self	38.44	35.60	38.84	33.66
Use of 6s and 1s (K-Z)	10.94	5.60	12.61	11.12
Use of 5s and 2s (K-Z)	4.86	8.60	3.62	5.53
Tennessee Total Self	344.70	326.36	354.37	363.12
Personality Integration	5.53	8.40	4.56	5.75
Use of 5s and 1s (TSCS)	54.98	32.52	64.87	61.66
Use of 4s and 2s (TSCS)	25.24	43.12	19.16	23.28
Permutation	2.03	3.12	1.81	2.34

TABLE 9 (Continued)

Pendulum	2.00	3.08	1.75	2.00
Balance	1.56	2.60	1.37	1.50